# Course Outcomes of all third Semester courses of 2022 scheme

Subject: **AV Mathematics-III for EC Engineering** Sub Code: BMATEC301

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C201.1 | Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory. |
| C201.2 | To use Fourier transforms to analyze problems involving continuous-time signals |
| C201.3 | To apply Z-Transform techniques to solve difference equations |
| C201.4 | Understand that physical systems can be described by differential equations and solve such equations |
| C201.5 | Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data |

Subject: **Digital System Design Using Verilog** Sub Code: BEC302

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C202.1 | Simplify Boolean functions using K-map & Quine-McCluskey minimization technique. |
| C202.2 | Analyze and design MSI Components. |
| C202.3 | Analyze the concepts of Flip Flops (SR, D, T & JK) and design the synchronous sequential circuits using flip flops. |
| C202.4 | Understand the concept of verilog data flow description. |
| C202.5 | Describe the verilog behavioral & structural description. |

Subject: **Electronic Principles and Circuits** Sub Code: BEC303

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C203.1 | Understand the characteristics of BJTs and FETs for switching and amplifier circuits. |
| C203.2 | Design and analyze amplifiers and oscillators with different circuit configurations and biasing conditions. |
| C203.3 | Understand the feedback topologies and approximations in the design of amplifiers and oscillators. |
| C203.4 | Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers. |
| C203.5 | Understand the power electronic device components and its functions for basic power electronic circuits. |

Subject: **Network Analysis** Sub Code: BEC304

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C204.1 | Determine currents and voltages using source transformation/source shifting/mesh/nodal analysis and reduce given network using star delta transformation/source transformation / source shifting. |
| C204.2 | Solve network problems by applying superposition/Reciprocity/Thevenin's Norton's/Maximum power transfer/Milliman's network theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions. |
| C204.3 | Calculate current and voltage for the given circuit under transient conditions. |
| C204.4 | Apply Laplace transform to solve the given network. |
| C204.5 | Evaluate for RLC elements/frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through RLC elements in resonant circuits. |

Subject: **Analog and Digital Electronics Lab** Sub Code: BECL305

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C205.1 | Design and analyze the BJT/FET amplifier and oscillator circuits. |
| C205.2 | Design and test Op-amp circuits to realize the mathematical computations, DAC and precision rectifiers. |
| C205.3 | Design and test the combinational logic circuits for the given specifications. |
| C205.4 | Test the sequential logic circuits for the given functionality. |
| C205.5 | Demonstrate the basic circuit experiments using 555 timers. |

Subject: **Sensors and Instrumentation** Sub Code: BEC306B

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C207.1 | Understand the material properties required to make sensors. |
| C207.2 | Describe the manufacturing process of sensors |
| C207.3 | Analyze the instrument characteristics and errors. |
| C207.4 | Describe the principle of operation and develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency. |
| C207.5 | Understand the principle of transducers for measuring physical parameters. |

Subject: **MATLAB Programming** Sub Code: BEC358B

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C212.1 | Understand the syntax of MATLAB for arithmetic computations, arrays, matrices. for the given specifications |
| C212.2 | Understand the built in function, saving and loading data, and create plots corrupted bandlimited channels. |
| C212.3 | Create program using symbolic computations, Importing and exporting data and files |
| C212.4 | Create program using character strings, Command line functions and Built-in functions. |

**Criteria Coordinator** **Programme Coordinator** **HOD**

# Course Outcomes of 3rd Semester to 5th Semester Courses -2021 scheme

Subject: **Transform Calculus, Fourier Series and Numerical Techniques** Sub Code: 21MAT31

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C201.1 | Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering. |
| C201.2 | Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory. |
| C201.3 | To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations |
| C201.4 | To solve mathematical models represented by initial or boundary value problems involving partial differential equations |
| C201.5 | Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis. |

Subject:**Digital System Design Using Verilog** Sub Code: 21EC32

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C202.1 | Simplify Boolean functions using K-map & Quine-McCluskey minimization technique. |
| C202.2 | Analyze and design MSI Components. |
| C202.3 | Analyze the concepts of Flip Flops (SR, D, T & JK) and design the synchronous sequential circuits using flip flops. |
| C202.4 | Understand the concept of verilog data flow description. |
| C202.5 | Describe the verilog behavioral & structural description. |

Subject:**Basic Signal Processing** Sub Code: 21EC33

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C203.1 | Understand the basics of Linear Algebra |
| C203.2 | Analyze different types of signals and systems |
| C203.3 | Analyze the properties of discrete time signals & systems |
| C203.4 | Analyze discrete time signals & systems using Z transforms |

Subject:**Analog Electronic Circuits** Sub Code: 21EC34

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C204.1 | Understand the characteristics of BJT sand FETs for switching and amplifier circuits. |
| C204.2 | Design and analyze FET amplifiers and oscillators with different circuit configurations and biasing conditions. |
| C204.3 | Understand the feedback topologies and approximations in the design of amplifiers and oscillators |
| C204.4 | Design of circuits using linear ICs for wide range applications such as ADC, DAC, filters and timers. |
| C204.5 | Understand the power electronic device components and its functions for basic power electronic circuits. |

Subject:**Analog and Digital Electronics Lab** Sub Code: 21EC35

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C205.1 | Design and analyze the BJT/FET amplifier and oscillator circuits. |
| C205.2 | Design and test Op-amp circuits to realize the mathematical computations, DAC and precision rectifiers. |
| C205.3 | Design and test the combinational logic circuits for the given specifications. |
| C205.4 | Test the sequential logic circuits for the given functionality. |
| C205.5 | Demonstrate the basic circuit experiments using 555 timers. |

Subject:**Linear Integrated Circuits Lab using Pspice/MultiSIM** Sub Code: 21EC383

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C206.1 | Sketch/draw circuit schematics, construct circuits, analyze and troubleshoot circuits containing op-amps, resistors, diodes, capacitors and independent sources. |
| C206.2 | Relate to the manufacturer's data sheets of IC 555 timer and IC μa741 op-amp. |
| C206.3 | Realize and verify the operation of analog integrated circuits like Amplifiers, Precision Rectifiers, Comparators and Waveform generators. |
| C206.4 | Design and implement analog integrated circuits like Oscillators, Active filters, Timer circuits, Data converters and compare the experimental results with theoretical values. |

Subject: **Complex Analysis, Probability and Statistical Methods** Sub code:21MAT41

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C207.1 | Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing. |
| C207.2 | Obtain Series Solutions of Ordinary Differential Equation. |
| C207.3 | Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data. |
| C207.4 | Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field. |
| C207.5 | Construct joint probability distributions and demonstrate the validity of testing the hypothesis. |

Subject:**Digital Signal Processing** Sub Code: 21EC42

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C208.1 | Determine response of LTI systems using time domain and DFT techniques |
| C208.2 | Compute DFT of real and complex discrete time signals. |
| C208.3 | Compute DFT using FFT algorithms. |
| C208.4 | Design FIR and IIR Digital Filters. |
| C208.5 | Computation of signal processing operations using DSP processor. |

Subject:**Circuits and Controls** Sub Code: 21EC43

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C209.1 | Analyze and solve Electric circuit, by applying, loop analysis, Nodal analysis and by applying network Theorems. |
| C209.2 | Evaluate two port parameters of a network and Apply Laplace transforms to solve electric networks. |
| C209.3 | Deduce transfer function of a given physical system, from differential equation representation or Block Diagram representation and SFG representation. |
| C209.4 | Calculate time response specifications and analyze the stability of the system. |
| C209.5 | Draw and analyze the effect of gain on system behavior using time response, frequency response methods And time response of system by state model approach. |

Subject: **Communication Theory** Sub Code: 21EC44

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C210.1 | Understand the amplitude & frequency modulation techniques and perform time and frequency domain transformations. |
| C210.2 | Identify the schemes for amplitude and frequency modulation & demodulation of analog signals and compare the performance. |
| C210.3 | Characterize the influence of channel noise on analog modulated signals. |
| C210.4 | Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems. |
| C210.5 | IllustrationofdigitalformattingrepresentationsusedforMultiplexers,Vocoders and Video transmission. |

Subject**: Biology for Engineers** Sub Code: 21BE45

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C211.1 | Elucidate the basic biological concepts via relevant industrial applications and case studies. |
| C211.2 | Evaluate the principles of design and development, for exploring novel bioengineering projects. |
| C211.3 | Corroborate the concepts of biomimetics for specific requirements. |
| C211.4 | Think critically towards exploring innovative biobased solutions for socially relevant problems. |

Subject: **Communication Laboratory** Sub Code: 21EC46

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C212.1 | Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain. |
| C212.2 | Design and test the sampling, Multiplexing and PAM with relevant circuits. |
| C212.3 | Demonstrate the basic circuitry and operations used in AM and FM receivers. |
| C212.4 | Illustrate the operation of PCM and delta modulations for different input conditions |
| C212.5 | Demonstrate the AM and FM modulation and demodulation by representing the signals in time and frequency domain. |

Subject: **Constitution Of India, Professional Ethics** Sub Code: 21CIP47

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C213.1 | Analyze the basic structure of Indian Constitution |
| C213.2 | Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. |
| C213.3 | know about our Union Government, political structure & codes, procedures. |
| C213.4 | Understand our State Executive & Elections system of India. |
| C213.5 | Remember the Amendments and Emergency Provisions, other important provisions given by the constitution. |

Subject: **Embedded C Basics Lab** Sub Code: 21EC481

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C214.1 | Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051 C |
| C214.2 | Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases. |
| C214.3 | Develop programs for 8051 Microcontroller to implement real world problems |
| C214.4 | Design and Develop Mini projects |
| C214.5 | Write C programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051C |

Subject: **Universal Human Values** Sub Code: 21ECL47

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C215.1 | Holistic vision of life |
| C215.2 | Socially responsible behavior |
| C215.3 | Environmentally responsible work |
| C215.4 | Ethical human conduct |
| C215.5 | Having Competence and Capabilities for Maintaining Health and Hygiene |

Subject: **Digital Communication** Sub Code: 21EC51

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C301.1 | Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications. |
| C301.2 | Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels. |
| C301.3 | Differentiate various spread spectrum schemes and compute the performance |

| | |
|---|---|
| | parameters of communication system |
| C301.4 | Apply the fundamentals of information theory and perform source coding for given message |
| C301.5 | Apply different encoding and decoding techniques with error Detection and Correction. |

Subject: **Computer Organization & ARM Microcontrollers** Sub Code: 21EC52

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C302.1 | Explain the basic organization of a computer system. |
| C302.2 | Demonstrate functioning of different sub systems, such as processor, Input/output, and memory. |
| C302.3 | Describe the architectural features and instructions of 32-bit microcontroller ARM Cortex M3. |
| C302.4 | Apply the knowledge gained for Programming ARM Cortex M3 for different applications |

Subject: **Computer Communication Networks** Sub Code: 21EC53

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C303.1 | Understand the concepts of networking thoroughly. |
| C303.2 | Identify the protocols and services of different layers |
| C303.3 | Distinguish the basic network configurations and standards associated with each network |
| C303.4 | Discuss and analyze the various applications that can be implemented on networks |

Subject: **Electromagnetic Waves** Sub Code: 21EC54

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C304.1 | Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume. |
| C304.2 | Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem |
| C304.3 | Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations |
| C304.4 | Calculate magnetic force, potential energy and Magnetization with respect to magnetic |

| | |
|---|---|
| | materials and voltage induced in electric circuits |
| C304.5 | Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem |

Subject: **Communication Lab II** Sub Code: 21ECL55

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C305.1 | Design and test the digital modulation circuits and display the waveforms. |
| C305.2 | To Implement the source coding algorithm using C/C++/ MATLAB code |
| C305.3 | To Implement the Error Control coding algorithms using C/C++/ MATLAB code |
| C305.4 | Illustrate the operations of networking concepts and protocols using C programming and networksimulators |

Subject: **IoT (Internet of Things) Lab** Sub Code: 21EC581

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C306.1 | Understand internet of Things and its hardware and software components |
| C306.2 | Interface I/O devices, sensors & communication modules |
| C306.3 | Remotely monitor data and control devices |
| C306.4 | Develop real life IoT based projects |

Subject: IPR Sub Code: 21EC56

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C307.1 | To know the meaning of engineering research |
| C307.2 | To know the procedure of Literature Review and Technical Reading. |
| C307.3 | To know the fundamentals of patent laws and drafting procedure . |
| C307.4 | Understanding the copyright laws and subject matters of copyrights and designs |
| C307.5 | Understanding the basic principles of design rights . |

Subject: Environmental Study Sub Code: 21CIV57

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C308.1 | Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale. |

| | |
|---|---|
| C308.2 | Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment. |
| C308.3 | Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components. |
| C308.4 | Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues. |
| C308.5 | Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale. |

Subject: **IoT (Internet of Things) Lab** Sub Code: 21EC581

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C309.1 | Understand internet of Things and its hardware and software components |
| C309.2 | Interface I/O devices, sensors & communication modules |
| C309.3 | Remotely monitor data and control devices |
| C309.4 | Develop real life IoT based projects |

Criteria Coordinator  Programme Coordinator  HOD

# Course Outcomes of all the courses from 3rd Semester to 8th Semester

Subject: **Transform Calculus, Fourier Series And Numerical Techniques** Sub Code: 18MAT31

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C201.1 | Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering. |
| C201.2 | Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory. |
| C201.3 | Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems |
| C201.4 | Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods. |
| C201.5 | Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis. |

Subject: **Network Theory** Sub Code: 18EC32

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C202.1 | Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce givennetwork using star-delta transformation/source transformation/ source shifting. |
| C202.2 | Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions. |
| C202.3 | Calculate current and voltages for the given circuit under transient conditions. |
| C202.4 | Apply Laplace transform to solve the given network. |
| C202.5 | Solve the given network using specified two port network parameter like Z or Y or T or h and to understand the concept of resonance |

Subject:**Electronic Devices**Sub Code: 18EC33

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C203.1 | Understand the principles of semiconductor Physics. |
| C203.2 | Understand the principles and characteristics of different types of semiconductor devices. |
| C203.3 | Utilize the mathematical models of transistor for circuits and systems. |
| C203.4 | Utilize the mathematical models of MOS transistors for circuits and systems. |
| C203.5 | Understand the fabrication process of semiconductor devices. |

Subject**: Digital System Design** Sub Code: 18EC34

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C204.1 | Explain the concepts of combinational and sequential logic circuits. |
| C204.2 | Analyze &Design the combinational logic circuits. |
| C204.3 | Describe & Characterize flip-flops & its applications. |
| C204.4 | Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines. |
| C204.5 | Design the applications of combinational and sequential circuits. |

Subject: **Computer Organization and Architecture**Sub Code: 18EC35

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C205.1 | Explain the basic organization of a computer system. |
| C205.2 | Explain different addressing modes and additional instructions. |
| C205.3 | Explain different ways of accessing an input / output device including interrupts. |
| C205.4 | Illustrate the organization of different types of semiconductor and other secondary storage memories. |
| C205.5 | Illustrate simple processor organization based on hardwired control and micro programmed control. |

Subject: **Power Electronics and Instrumentation** Sub Code: 18EC36

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C206.1 | Build and test circuits using power electronic devices. |
| C206.2 | Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS. |
| C206.3 | Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency and Define instrument errors. |
| C206.4 | Describe the principle of operation of Digital instruments and PLCs. |
| C206.5 | Use Instrumentation amplifier for measuring physical parameters. |

Subject: **Electronic Devices and Instrumentation Lab** Sub Code: 18ECL37

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C207.1 | Recognize and demonstrate functioning of semiconductor power devices. |
| C207.2 | Evaluate characteristics, switching, power conversion and control by semiconductor devices. |
| C207.3 | Analyze the response and plot characteristics of transducers such as LDR, Photo diode etc. |
| C207.4 | Design and test simple electronic circuit for measurement of temperature and resistance. |
| C207.5 | Use circuit simulation software for the implementation and characterization of electronic circuit devices. |

Subject: **Digital System Design Lab** Sub Code: 18ECL38

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C208.1 | Design, realize and verify Demorgan's theorems, SOP & POS forms. |
| C208.2 | Demonstrate the truth table of various expressions & combinational circuits using logic gates. |
| C208.3 | Design various combinational circuits such as adders, subtractors, comparators, multiplexers and de-multiplexers. |
| C208.4 | Construct flip-flops, shift registers and counters. |
| C208.5 | Simulate serial adder and binary multiplier. |

Subject: **COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS** Sub Code: 18EC41

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C209.1 | Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory. |
| C209.2 | Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flowvisualization and image processing. |
| C209.3 | Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field. |
| C209.4 | Make use of the correlation and regression analysis to fit a suitable mathematical model for thestatistical data. |
| C209.5 | Construct joint probability distributions and demonstrate the validity of testing the hypothesis. |

Subject: **Analog Circuits** Sub Code: 18EC42

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C210.1 | Analysis of biasing types and small signal models of BJT and MOSFET. |
| C210.2 | Study of MOSFET amplifier configuration and Oscillators. |
| C210.3 | Describe the construction and working principle of feedback amplifiers and Power amplifiers. |
| C210.4 | Understand the functioning of linear ICs. |
| C210.5 | Design of linear IC based circuits. |

Subject**: Control Systems** Sub Code: 18EC43

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C211.1 | Develop the mathematical model of Mechanical & Electrical Systems. |
| C211.2 | Develop transfer function for a given control system using block diagram reduction techniques & signal flow graph method. |
| C211.3 | Determine the time domain specifications for first & Second order systems. |
| C211.4 | Determine the stability of a system in the time domain using Routh Hurwitz criterion & Root Locus Techniques. |
| C211.5 | Determine the stability of a system in the frequency domain using Nyquist & Bode Plots. |

Subject: **Engg. Statistics and Linear Algebra** Sub Code: 18EC44

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C212.1 | Identify and associate Random Variables and Random Processes in Communication events. |
| C212.2 | Analyze and model the Random events in typical communication events to extract quantitative statistical parameters. |
| C212.3 | Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency |
| C212.4 | Explain vector spaces and it's dimensions |
| C212.5 | Compute determinats, diagonalize and Singular Value Decomposition |

Subject: **Signals and Systems** Sub Code: 18EC45

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C213.1 | Classify signals as continuous/discrete, periodic/ aperiodic, even odd, energy/power and deterministic/random signals. |
| C213.2 | Determine linearity, causality, time-invariance and stability properties of continuous and discrete time systems. |
| C213.3 | Compute the response of continuous and discrete LTI system using convolution integral and Sum |
| C213.4 | Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis |
| C213.5 | Compute Z-transforms, inverse Z-transforms and transfer functions of complex LTI systems. |

Subject:**Microcontroller** Sub Code: 18EC46

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C214.1 | Explain the difference between Microprocessor & Microcontroller Architecture of 8051 &Interfacing it to external memory. |
| C214.2 | Write 8051 Assembly level programs using instruction set. |
| C214.3 | Explain interfacing of 8051 with LEDs and Switches using the concepts of stack, subroutines concepts of Assembly level programming. |
| C214.4 | Explain the Interrupt system, operation of Timers/Counters and serial port of 8051 |
| C214.5 | Write an Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using port and to generate external interrupt using switch |

Subject: **Microcontroller Lab** Sub Code: 18ECL47

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C215.1 | Write Assembly language programs in 8051 for solving simple problems. |
| C215.2 | Write Assembly language programs that manipulate input data using different instructions of 8051. |
| C215.3 | Interface different input and output devices to 8051. |
| C215.4 | Control input and output devices to 8051 using Assembly language programs. |
| C215.5 | Interface the serial devices to 8051 and do the serial transfer using C programming |

Subject: **Analog Circuits Lab** Sub Code: 18ECL48

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C216.1 | Analyze frequency response of JFET/MOSFET amplifier. |
| C216.2 | Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics. |
| C216.3 | Apply the knowledge gained in design of BJT/FETs circuits in oscillators. |
| C216.4 | Design analog circuits using OPAMPs for different applications. |
| C216.5 | Simulate and analyze analog circuits that uses ICs for different electronic applications. |

Subject: **Management & Entrepreneurship** Sub Code: 18EC51

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C301.1 | Understand the fundamental concepts of Management & Entrepreneurship & Opportunities in order to setup a business. |
| C301.2 | Identify the various organizations architecture. |
| C301.3 | Describe the functions of Managers, Entrepreneurs & their Social Responsibilities. |
| C301.4 | Understand the components in developing a business plan. |
| C301.5 | Recognize the various sources of funding & institutions supporting entrepreneurs |

Subject: **Digital Signal Processing** Sub Code: 18EC52

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C302.1 | Determine response of LTI systems using time domain and DFT techniques. |
| C302.2 | Compute DFT of real and complex discrete time signals. |
| C302.3 | Computation of DFT using FFT algorithms and linear filtering approach. |
| C302.4 | Design and realize FIR and IIR digital filters |
| C302.5 | Understand the DSP processor architecture. |

Subject: **Principles of Communication Systems** Sub Code: 18EC53

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C303.1 | Analyze and Compute performance of amplitude modulation schemes in time and frequency domains. |
| C303.2 | Analyze and compute performance angle modulation schemes in time and frequency domains. |
| C303.3 | Analyze and Compute the performance of AM and FM system in the presence of noise. |
| C303.4 | Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems. |

| | |
|---|---|
| C303.5 | Analyze and Compute the performance digital formating process and demon stare its use in multiplexers and encoders. |

Subject: **Information Theory and Coding** Sub Code: 18EC54

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C304.1 | Explain concept of dependent & independent source, measure of information, entropy, rate of information and order of a source. |
| C304.2 | Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman encoding algorithms. |
| C304.3 | Model the continuous and discrete communication channels using input, output and joint probabilities. |
| C304.4 | Determine a codeword comprising of the check bits computed using linear block codes, cyclic codes & convolutional codes. |
| C304.5 | Design the encoding and decoding circuits for linear block codes, cyclic codes, convolutional codes, BCH and Golay codes. |

Subject: **Electromagnetic waves** Sub Code: 18EC55

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C305.1 | Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume. |
| C305.2 | Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem. |
| C305.3 | Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different currentconfigurations |
| C305.4 | Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits. |
| C305.5 | Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem. |

Subject: **Verilog HDL**Sub Code: 18EC56

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C306.1 | Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction. |
| C306.2 | Design and verify the functionality of digital circuit/system using test benches. |

| | |
|---|---|
| C306.3 | Identify the suitable Abstraction level for a particular digital design. |
| C306.4 | Write the programs more effectively using Verilog tasks, functions and directives. |
| C306.5 | Perform timing and delay Simulation. Interpret the various constructs in logic synthesis. |

Subject:**DSP Lab** Sub Code: 18ECL57

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C307.1 | Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals. |
| C307.2 | Modeling of discrete time signals and systems and verification of its properties and results. |
| C307.3 | Implementation of discrete computations using DSP processor and verify the results. |
| C307.4 | Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal. |

Subject:**HDL Lab** Sub Code: 18EC58

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C308.1 | Write the Verilog programs to simulate Combinational circuits in Dataflow and Behavioral. |
| C308.2 | Write the Verilog programs to simulate Combinational circuits in Gate level Abstractions. |
| C308.3 | Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms. |
| C308.4 | Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware. |
| C308.5 | Interface the hardware to the programmable chips and obtain the required output |

Subject:**Digital Communication** Sub Code: 18EC61

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C309.1 | Associate and apply the concepts of Bandpass sampling to well specified signals and channels. |
| C309.2 | Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels. |
| C309.3 | Explain digital modulation techniques. |
| C309.4 | Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels. |

| | |
|---|---|
| C309.5 | Demonstrate that bandpass signals subjected to corruption and distortion in a bandlimited channel can be processed at the receiver to meet specified performance criteria. |

Subject:**Embedded Systems**Sub Code: 18EC62

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C310.1 | Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3. |
| C310.2 | Apply the knowledge gained for Programming ARM Cortex M3 for different applications. |
| C310.3 | Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system. |
| C310.4 | Develop the hardware software co-design and firmware design approaches. |
| C310.5 | Explain the need of real time operating system for embedded system applications. |

Subject:**Microwave and Antenna** Sub Code: 18EC63

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C311.1 | Describe the use and advantages of microwave transmission |
| C311.2 | various parameters related to microwave transmission lines and waveguides |
| C311.3 | Identify microwave devices for several applications |
| C311.4 | Analyze various antenna parameters necessary for building a RF system |
| C311.5 | Recommend various antenna configurations according to the applications |

Subject: **Operating Systems** Sub Code: 18EC64

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C312A.1 | Explain the goals, structure, operation and types of operating systems. |
| C312A.2 | Apply scheduling techniques to find performance factors. |
| C312A.3 | Apply suitable techniques for contiguous and non-contiguous memory allocation. |
| C312A.4 | Explain organization of file systems and IOCS. |
| C312A.5 | Describe message passing, deadlock detection and prevention methods. |

Subject: **Python Application Programming** Sub Code:18EC646

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C312B.1 | Examine syntax and semantics and be fluent in the use of python flow control and functions. |
| C312B.2 | Demonstrate proficiency in handling strings and file systems. |
| C312B.3 | Create, run and manipulate python programs using core data structures like Lists, Dictionaries and use regular expressions. |
| C312B.4 | Interpret the concepts of object-oriented programming as used in python. |
| C312B.5 | Implement exemplary applications related to network programming, Web services and databases in python |

Subject: **Sensors and signal conditioning** Sub Code: 18EC652

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C314.1 | Appreciate various types of sensors and the material properties required to make sensors. |
| C314.2 | Understand reactance and electromagnetic sensors and signal conditioning for it. |
| C314.3 | Describe the self generating sensors. |
| C314.4 | Explain digital and intelligent sensors. |
| C314.5 | Understand sensors based on semiconductor junction. |

Subject: **Communication Lab** Sub Code: 18EC66

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C314.1 | Design and test circuits for analog modulation and demodulation schemes. |
| C314.2 | Determine the characteristics and response of microwave waveguide. |
| C314.3 | Determine characteristics of microstrip antennas and devices and compute the parameters associated with it. |
| C314.4 | Design and test the digital and analog modulation circuits and display the waveforms. |
| C314.5 | Simulate the digital modulation systems & compare the error performance of basic digital |

Subject: **Embedded System Lab** Sub Code: 18ECL67

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C315.1 | Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language. |
| C315.2 | Develop assembly language programs using ARM Cortex M3 for different applications. |
| C315.3 | Interface external devices and I/O with ARM Cortex M3. |
| C315.4 | Develop C language programs for embedded system applications. |
| C315.5 | Develop library functions for embedded system applications. |

Subject: **Mini-Project** Sub Code: 18ECMP68

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C316.1 | Students will be able to practice acquired knowledge within the chosen area of technology for project development |
| C316.2 | Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. |
| C316.3 | Reproduce, improve and refine technical aspects for engineering projects. |
| C316.4 | Work as an individual or in a team in development of technical projects. |
| C316.5 | Communicate and report effectively project related activities and findings. |

Subject:**Computer Networks** Sub Code: 18EC71

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C401.1 | Understand the concepts of networking thoroughly |
| C401.2 | Describe various networking architectures |
| C401.3 | Identify the protocols and services of different layers. |
| C401.4 | Distinguish the basic network configurations and standards associated with each network |
| C401.5 | Analyze a simple network and measurement of its parameters. |

Subject: **VLSI Design** Sub Code: 18EC72

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C402.1 | Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling. |
| C402.2 | Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects. |
| C402.3 | Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements |
| C402. 4 | Interpret Memory elements along with timing considerations. |
| C402. 5 | Interpret testing and testability issues in VLSI Design |

Subject: **Digital Image Processing** Sub Code: 18EC733

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C403.1 | Understand image formation and the role human visual system plays in perception of gray and color image data. |
| C403.2 | Apply image processing techniques in spatial domain. |
| C403.3 | Apply image processing techniques in frequency domain |
| C403.4 | Conduct independent study and analysis of Image Enhancement and restoration techniques. |
| C403.5 | Design and evaluate image analysis techniques |

Subject**: Machine Learning with Python** Sub Code: 18EC745

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C404.1 | Identify the problems in machine learning. |
| C404.2 | Select supervised, unsupervised or reinforcement learning for problem solving. |
| C404.3 | Apply theory of probability and statistics in machine learning |
| C404.4 | Apply concept learning, ANN, Bayes classifier, k nearest neighbour |
| C404.5 | Perform statistical analysis of machine learning techniques. |

Subject: **Energy And Environment** Sub Code:18EC751

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C404.1 | Summarize the basic concepts of energy, its distribution and general Scenario. |
| C404.2 | Explain different energy storage systems, energy management, audit and economic analysis. |
| C404.3 | Summarize the environment eco system and its need for awareness. |
| C404.4 | Identify the various types of environment pollution and their effects. |
| C404.5 | Discuss the social issues of the environment with associated acts. |

Subject: **Computer Networks Laboratory** Sub Code: 18ECL76

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C406.1 | Choose suitable tools to model network and understand the protocols at various OSI reference levels. |
| C406.2 | Design a suitable network and simulate using a network simulator tool. |
| C406.3 | Analyze the networking concepts and protocols using C/C++ Programming. |
| C406.4 | Model the networks for different configurations and analyze the results. |
| C406.1 | Choose suitable tools to model network and understand the protocols at various OSI reference levels. |

Subject:**VLSI Laboratory** Sub Code: 18ECL77

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C407.1 | Design and simulate combinational and sequential digital circuits using Verilog HDL |
| C407.2 | Understand the Synthesis process of digital circuits using EDA tool |
| C407.3 | Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list |
| C407.4 | Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers amplifiers |
| C407.5 | Perform RTL-GDSII flow and understand the stages in ASIC design |

Subject:**Project Work Phase – I** Sub Code: 18ECP78

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C408.1 | Demonstrate a sound technical knowledge of their selected project topic. |
| C408.2 | Undertake problem identification, formulation and solution. |
| C408.3 | Design engineering solutions to complex problems utilizing a systems approach |
| C408.4 | Survey the changes and advancements in the related area. |
| C408.5 | Engineers and the community at large in written/oral forms. |

Subject**: Wireless and Cellular Communication** Sub Code: 18EC81

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C409.1 | Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels. |
| C409.2 | Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network. |
| C409.3 | Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network. |
| C409.4 | Understand the basic operations and architecture of air interface in a LTE 4G system. |
| C409.1 | Understand the concepts of OFDMA and SC-FDMA used in 4G LTE systems. |

Subject: **Network Security** Sub Code: 18EC821

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C410.1 | Explain network security services and mechanisms and explain security concepts |
| C410.2 | Understand the concept of Transport Level Security and Secure Socket Layer. |
| C410.3 | Explain Security concerns in Internet Protocol security |
| C410.4 | Explain Intruders, Intrusion detection and Malicious Software |
| C410.5 | Explain Firewalls, Firewall Characteristics, Biasing and Configuration |

Subject: **Project Work** Sub Code: 18ECP83

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C412.1 | Learn on their own, reflect on their learning and take appropriate actions to improve it. |
| C412.2 | Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task |
| C412.3 | Design and implementation of engineering solutions to societal/ environment/energy and automation problems utilizing a systems Approach. |
| C412.4 | Present the project and be able to defend it. |
| C412.5 | Communicate effectively and to present ideas clearly and coherently in both the written and oralforms. |

Subject: **Seminar Work** Sub Code: 18ECS84

After successful completion of this course, the students will be able to;

| CO | Description |
|---|---|
| C413.1 | Identify a topic and survey the changes in the technologies/concepts relevant to the topic |
| C413.2 | Discuss the technology and interpret the impact on the society, environment and the domain. |
| C413.3 | Describe the behaviours and characteristics of an effective learner. |
| C413.4 | Exhibiting good oral and written communication skills. |
| C413.5 | Apply principles of ethics and respect in interaction and compile the report |

**Criteria Coordinator**

**Programme Coordinator**

**HOD**

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